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THE NATURE OF ENGLISH PLURALIZATION RULES OF KINDERGARTEN CHILDREN.

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STUDIES WERE MADE OF THE ABILITY OF KINDERGARTEN CHILDREN TO CONTROL CORRECT PLURALIZATION RULES FOR ENGLISH NOUNS. PRODUCTION AND RECOGNITION TASKS WERE USED, WITH CARTOON PICTURES OF ANIMALS WITH NONSENSE NAMES. THE CHILDREN WERE ASKED TO GIVE SINGULAR NAMES FROM CORRECT PLURAL NAMES, AND VICE VERSA, AND TO CHOOSE THE BEST NAMES FOR THE ANIMALS. TWO FURTHER SERIES OF STUDIES EXAMINED SPECIAL RULES USED BY THE CHILD AND THE NATURE OF HIS PLURALIZATION AS COMPARED TO THE STANDARD RULES OF ADULT ENGLISH SPEAKERS. THE DIFFERENCE BETWEEN PRODUCTION AND RECOGNITION PROCEDURES WAS FOUND TO BE CHARACTERIZED IN TERMS OF PATTERNS OF ERRORS, RATHER THAN SOLELY IN QUANTITATIVE TERMS. IT WAS ALSO DISCOVERED THAT THE SUBJECT DOES NOT RESPOND ONLY ON THE BASIS OF HIS KNOWLEDGE OF A PARTICULAR SET OF LINGUISTIC RULES, BUT USES A LARGER STORE OF KNOWLEDGE, INCLUDING GRAMMATICAL RULES, LANGUAGE HABITS, AND STATISTICAL FACTS. (KL)

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The Nature of English Pluralization Rules of Kindergarten Children

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Abstract

Productive and receptive control of pluralization rules was investigated by asking 6-year old children to give nonsense names to cartoon animals. In Production tasks, the child was told the name for a single animal and required to produce the plural form, or vice versa. Children made more errors with syllables requiring the addition or deletion of the /ɨz/ allomorph than with syllables requiring either /s/ or /z/. The greater difficulty with the /ɨz/ marker was attributed to its infrequency in the child's language, and to the plural-sounding endings of singular nouns which take this allomorph. In Recognition tasks, however, the child, required to match pictures with names, made fewer errors with /z/ than with either /s/ or /ɨz/. The frequency and dependability of /z/ as a marker of plurality helped explain its low error rate in Recognition tasks. Other studies indicated that the child has abstracted the general rule that pluralization involves lengthening the singular form, and that he uses numbers as substitutes for the standard allomorphs of plurality.

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The Nature of English Pluralization Rules of Kindergarten Children

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A detailed investigation of the nature of the pluralization rules of 6-year old children is reported in this paper. This research tries to determine the extent of the child's acquisition of the standard rules of adult speakers of English and to uncover any peculiarities in children's representation of the singular-plural relation.

The correct choice of plural allomorph for regular English nouns is determined by the final phoneme of the singular form of the noun. Three alternatives are available. The plural allomorph /ɨz/ is used after the sibilants /s, z, š, ž/ and the affricates /č, ǰ/ as in the words glasses, noses, rashes, garages, watches, and packages. The allormoph /s/ is required after all voiceless consonants /p, t, k, f, θ/ as in the nouns maps and paths, and /z/ appears after all other phonemes as in the words dogs and beds. A more complete description of these rules is given by Francis (1958).

How are such rules acquired? Presumably, the child discerns patterns of regularities in the adult speech to which he is exposed and induces rules to account for these regularities (See, for example, Brown & Fraser, 1963; Chomsky, 1965, pp. 47-59). From the words, phrases, and sentences that he hears, he abstracts certain rules which he uses until additional information causes him to revise them. This additional information may take the form of exposure to new vocabulary, experience with irregular sequences, or corrections

by parents. He will modify his rules repeatedly to incorporate these new data although a lag may exist between exposure to relevant data and active use of new rules based on those data (Ervin, 1964, p. 174; Menyuk, 1964, p. 545).

Because the child may not yet have been exposed to all pertinent linguistic data, his rules may be different from those of the adult community. Chomsky (1964a, p. 7), for instance, noted:

> It is by no means obvious that a child of six has mastered this phonological system in full--he may not yet have been presented with all of the evidence that determines the general structure of the English sound pattern.

With regard to plurality, some investigators (Ervin & Miller, 1963, pp. 123-124; Weir, 1962, p. 70) have suggested that a numeral preceding a noun may be construed by the young child as a sufficient marker of plurality, resulting in such constructions as "two book" and "one-two shoe." Such observations suggest that any attempt to study the nature of the child's pluralization rules must focus not only on his knowledge of "adult" rules but also on any other rules which he may adopt temporarily.

In studying the child's methods of pluralization, one cannot infer that the child lacks knowledge of certain rules if he does not apply them in particular situations. It is necessary to determine "the kinds of structures the person has succeeded in mastering and internalizing, whether or not he utilizes them, in practice..." (Chomsky, 1964b, p. 36). In order to minimize situational effects in studying the child's competence it is necessary to test him with both "productive" and "receptive" kinds of tasks (Brown and Berko, 1960). The child reveals one aspect of his competence when he produces

utterances on demand, in accordance with linguistic rules, and another when he recognizes instances of correct usage of these rules.

A technique for inferring receptive control of grammatical rules from a picture identification task has been described by Fraser, Bellugi, and Brown (1963). In a typical example, the child is shown a picture of one sheep jumping and another of two jumping. E says: "The sheep is jumping," and the child must point to the correct picture. Various grammatical contrasts can be tested by this procedure.

A similar technique has been developed by Berko (1958) for the study of productive control of morphological rules. Among other things, she investigated the child's ability to produce the plural form of nonsense syllable names. Berko showed the child a picture of a cartoon animal which she assigned a nonsense name: "This is a WUG." She told the child that another animal had come along: Now "there are two of them." She showed him a picture of the two animals and said: "There are two _____" expecting the child to supply the plural form WUGS. She was interested in the child's ability to produce the three regular plural allomorphs.

Berko gave her figures new names so that if the child answered correctly, she could infer that he had used a rule and that he had not merely relied on his memory for a particular plural name previously heard. She selected a number of nonsense words whose plurals were formed with the allomorphs /z/ and /ɨz/ as well as one (HEAF) for which adults allowed either /s/ (HEAFS) or /z/ (HEAVES).

The results showed that children in the age range of four to seven years made approximately 67% errors with the names requiring /ɨz/ but only 25% errors with names requiring /z/. Berko also found that most children

had an appropriate model in their lexicon for the /ɨz/ form since 91% of them could correctly form the plural of the word glass. Because of their limited experience with /ɨz/, however, young children may not have yet induced the relevant rule and therefore are unable to extend this form to new situations. Errors typically took the form of no response or repetition of the singular form.

Although this was a carefully conducted study, several limitations restrict the inferences which may be drawn from it. First, Berko tested only productive control of pluralization rules and did not attempt to study receptive control. Further, the children were required, at all times, to produce a plural form, having been given the singular form. A broader understanding of the child's concept of singularity-plurality may be gained from an analysis of his ability to produce the singular form when he has been given the plural form. Since, in the plural-singular sequence, the child has only to drop the plural marker, one might expect him to make fewer errors in this sequence than in the singular-plural sequence. Even this task, however, may cause the child considerable difficulty. Bruce (1964) indicated that the young child is unable to fractionate words. He cannot report what is left after the removal of certain phonemes. Bruce suggested that this inability to fractionate is due to the cohesiveness of word sound patterns in the child's experience. Huttenlocher (1964) also suggested that a child's linguistic perceptual unit may be somewhat larger than an adult's. Thus if the child always hears the word glasses in a plural context, he may not recognize that this is derived from the singular root word glass.

Another limitation of Berko's study was the fact that she used an unequal distribution of the three allomorphs. This precluded making all

possible error comparisons. Finally, she always structured the task in the same way: "There are two _____." Her phrasing provided the child with both morphological and syntactic constraints which determined the response more fully than if she had said: "Now tell me what you see in the picture."

In general, however, Berko's approach seems to be useful for the exploration of the child's morphological rules, and we decided to extend her methods in studying what kind of rules the child has abstracted from the information available to him in the English language.

Pilot Study

In an exploratory study, two methods were used to investigate the child's linguistic concept of singularity-plurality: a Production task similar to Berko's in which the child was also asked to produce a singular name having been given the correct plural name, and a Recognition task in which the child had to choose the best name for a picture.

Ss were 18 kindergarten pupils with a mean age of 5 yrs 6 mo. The parents of the Ss in this study and in the other studies to be reported were skilled laborers, businessmen, or professionals. Ss in all studies were native speakers of English.

Brightly colored pictures of cartoon animals which had been given nonsense names were used. Thirty-six names were used in the Production task, and six in the Recognition task. The names were always chosen so that /s/, /z/, and /ɨz/ appeared equally often as the plural suffix. Berko's method of presentation, modified to take account of the considerations mentioned, was used for the Production task.

In the Recognition task, E showed S either a singular or plural picture, and said both the singular and plural forms of a nonsense name. He asked S to choose the word which sounded "best" to him as a name for the picture. "Would you call this picture (either singular or plural) WIB or WIBS?"

After S had replied, E reinforced a correct answer by saying "good" or said "no" to a wrong answer. If S answered incorrectly, an error was recorded, but S was asked to try again. Finally, E supplied the correct answer.

In the Production task, the children made many errors with /ɨz/ names (41%), but successively fewer with /s/ names (32%) and with /z/ names (28%). Statistical analysis (significance of difference between proportions; Ferguson, 1959) revealed that only the difference between errors with /z/ and with /ɨz/ was significant ($z = 2.86$, $p < .02$). Berko had also found more errors with /ɨz/ than with /z/. In the Recognition task, however, the error pattern was distinctly different from that of our Production task and from that of Berko's. The children made few errors with the /ɨz/ names (19%), but considerably more with both the /s/ names (36%) and with the /z/ names (28%). These differences between allomorphs in the Recognition task were not significant, possibly because of the small number of items used.

In many instances, the errors in the Production task took the form of no response, or repetition of the given name unchanged. More frequently, however, S would repeat the name as given and add appropriately a singular or a plural numeral to it. He would, for example, produce such responses as FIVE HESH and ONE ZAMS. This suggested that the child might be using numerals as alternate markers to distinguish singular from plural nouns.

Two main findings thus appear in the pilot experiment: the apparent use of numerals by some children to mark singularity and plurality, and the

distinctly different pattern of errors in the Production and Recognition tasks. To explore these findings further, two series of experiments were conducted. In the first, we tried to examine special rules which the child might use, and in the second, we studied his performance on a variety of production and recognition tasks to explore the nature of the child's pluralization rules in relation to the standard rules of adult English speakers.

Series I--Study 1: The Role of Numbers in Pluralization

A production task was administered to 14 kindergarten pupils with a mean age of 6 yrs 1 mo to examine the hypothesis that the young child uses numerals to mark plurality. Six grade-five students were given the same task as the younger Ss to ascertain whether the rules studied indeed governed the responses of more mature speakers. The fifth graders performed without error.

The procedure was that of Berko's original task in which a plural response was always required. Twelve pairs of pictures were used. Each pair consisted of a singular picture, assigned a name by E, and a plural picture used to elicit S's response. The plural picture contained two, three, or many (12 to 15) similar figures. Names were assigned according to the following procedure. Two lists of 12 names were constructed and alternated between Ss. Names of the two lists formed corresponding minimal pairs. For example, TEK appeared on the first list, therefore, TEG appeared on the second. The names were constructed from words which contained the final phonemes /b, d, g, p, t, k, č, ǰ, š, ž/. Each of these 10 phonemes was represented once in the list except for /č/ and /š/ which appeared twice.

Thus, six names required /ɨz/ for pluralization, three required /s/ and three required /z/. More names pluralized by the addition of /ɨz/ were used because the Pilot Study had shown that it was more difficult for Ss to produce plural names with this marker than with /s/ or with /z/. If number is an alternate marker of plurality, Ss should readily use numbers with names whose standard plural forms they cannot produce. In other words, there should be a greater proportion of number responses in cases where the standard marker is omitted (incorrect responses from an adult point of view) than in cases where the standard marker is used (correct responses from an adult point of view).

Analysis revealed no significant difference in number of errors with the two lists (t = .19) so the data were pooled for further analysis. Table 1 shows the distribution of number responses. These are expressed as ratios because of the unequal distribution of allomorphs. The proportion of errors with numbers (.32) was greater than that (.09) without numbers (t = 4.86, $p < .01$). But there was no corresponding difference in the Correct Response category. When numbers were used, significantly more errors and significantly fewer correct responses occurred with /ɨz/ than with either /s/ or with /z/ ($t > 2.69$, $p < .02$). But there were no differences among allomorphs in either the Correct or the Incorrect category when numbers were not used.

Insert Table 1 about here

These findings indicate that when Ss encountered a difficult item (usually one involving an /ɨz/) for which they could not produce the correct adult plural form, they at least appended a number to the singular form. Number-less incorrect responses were very infrequent (.09). But when the standard adult form was known to the children they weren't so careful to avoid

numberless responses (.27). It thus seems that 6-year old children do not consider numbers equal in status to the standard markers, but rather as substitutes to fall back on when the proper marker is not known.

Series I--Study 2: Does the Child Possess a "Pluralization by Addition" Rule?

In the recognition task of the Pilot Study, the children performed better in choices between singular and plural forms involving the /ɨz/ allomorph than in choices involving the other two allomorphs. Since the singular and plural forms of /ɨz/ words differ by two phonemes while forms of /s/ and /z/ words differ in only one, these results suggested that the child possessed a rule which could be called "pluralization by addition." Quite simply, this rule states that the plural form of a name is the singular form with something appended to it.

Three experiments were designed to investigate the "pluralization by addition" rule. The Ss in each of the first two experiments were 6 kindergarten pupils with a mean age of 5 yrs 11 mo. These Ss later participated in Study 3. In one experiment, S was shown a singular picture while E said: "This is called WAF." E then showed S a plural picture and asked him to choose the better of two names for the second picture. The choice was always between the original singular name and a longer name formed from the original root word. In one half (6) of the cases, a -k was added to the singular, e.g., WAFK; and in the other half (6) -kren was added, e.g., WAFKREN. The results clearly indicate a strong preference for the longer forms as plurals. In only two of the 72 trials did Ss choose

the original singular form to serve also as the plural form. The near unanimous choice (97%) of the longer forms over the non-changed forms precluded a comparison between the terms ending in -k and those ending in -kren. It was thus impossible to evaluate the original hypothesis which gave rise to this experiment.

A second experiment indicated that the general rule was one of addition rather than a rule to choose a different word for plurality. In this study, words such as WAFK were presented as the singular form, and S's choice for plurality involved either a form in which the final -k was dropped (WAF) or a longer word with -kren added (WAFKREN). Again, the results were unanimous. The longer form was chosen as the plural on 70 out of 72 occasions (97%) which implies a rule of "pluralization by addition."

One further experiment indicated that the general rule was one of addition rather than a rule to choose a word different in sound. In this experiment, 10 CVC syllables (e.g., BIP) were presented as the singular form, and Ss' choice for plurality involved either a form in which a vowel change had occurred (e.g., BOP) or a singular syllable with a suffix added (e.g., BIPUM). The following suffixes were appended: -en, -id, -ik, -in, -of, -or, -up, -lin, -um, and -sit. There were 20 Ss in this study ranging in age from 4 yrs 6 mo to 7 yrs 2 mo with a mean age of 5 yrs 11 mo. They were tested in their homes during the summer. Results again conclusively support the notion of an addition rule. The longer forms were preferred over those with vowel change in 72% of the trials ($t = 4.97$; $p < .001$). The lower level of preference (72% vs. 97%) for the longer form in this task as compared to the earlier two tasks could reflect the greater likelihood of a vowel change serving as a plural marker in English than no change or shortening performing

this function. However, it could also be due to differences in Ss and experimental setting.

It thus appears that even before the child has fully mastered the specific plural suffixes of English, he possesses a general rule to mark the plural by adding onto the singular code. Cross-cultural comparisons are needed to determine whether this additional rule is due to the influence of English or reflects a tendency for isomorphic coding, i.e., to increase the linguistic code when the referent is increased.

Series II--Study 3: The Child's Mastery of the Standard English Pluralization Rules

In the Pilot Study, different error patterns were found on the Production and the Recognition tasks. In the Production task, more errors occurred with /ɨz/ than with either /s/ or with /z/, whereas, in the Recognition task, fewer errors occurred with /ɨz/ than with either of the other two. These results, suggesting that the two tasks involved different processes, seemed to warrant further investigation.

Method

Subjects

The Ss were 36 kindergarten pupils with a mean age of 5 yrs 11 mo.

Materials and Procedure

Brightly colored pictures of cartoon animals were drawn on $8\frac{1}{2}$ x 11 in. yellow paper. These cartoon animals were given nonsense names. Figure 1 shows

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Insert Figure 1 about here

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several sample pictures. Nonsense names for each task were selected from a list of 36 words, and were systematically rotated among tasks. The names were constructed from words which contained the final phonemes /f, k, p, t, b, d, g, m, t, v, s, z, ǰ, ž, č, š/. Names were distributed so that /s/, /z/, and /ɨz/ appeared equally often as the plural suffix.

There were three Production and three Recognition tasks. Each S performed either the three Production or the three Recognition tasks. The order of task presentation was balanced among Ss. Ss were tested alphabetically.

E gave directions to S using a sample series of five or six pictures of real objects. The examples required both singular and plural responses. No S began any phase of the testing until he responded correctly to the sample pictures.

In all tasks, E said "good" when S replied correctly and "no" when he was wrong. In the latter case, E recorded an error but encouraged S to try again. E finally provided S with the correct answer.

Six varieties of errors were possible. Within each task, S's errors were tallied separately for the items which required a plural response (Plural errors), and for the items which required a singular response (Singular errors). Within each of these two categories, S could commit an error by failing to supply or to delete one of the three allomorphs /s/, /z/, or /ɨz/. Twelve responses were elicited on each task.

Production--Task 1: Words with Pictures. Task 1 was similar to the Production task of the Pilot Study. Twelve pairs of pictures were used: six singular stimulus, plural response pairs, and six plural stimulus, singular response pairs. In the singular stimulus case, E showed S a single figure

and named it. S was then shown another picture with several of the same figures, and E attempted to elicit a plural response from him. For example, in the singular stimulus, plural response conditions, E showed S a picture and said:

> This is a PASH. (S repeated PASH.)
> Several others have come along to join him.
> (The picture with several figures was shown
> to S.) Now tell me what you see in the picture.

This item requires a plural response with the allomorph /ɨz/--PASHES.

In the plural stimulus, singular response case, S was provided with the name for a plural picture and requested to produce the name for a singular picture. For example, E showed S a picture and said:

> These animals are called PASHES. (S repeated
> PASHES.) Some of them have gone away. (The
> picture with a single figure was shown to S.)
> Now tell me what you see in the picture.

This item requires a singular response with the allomorph /ɨz/ deleted--PASH.

Production--Task 2: Words Alone. Task 2 was similar to Task 1 except that no pictures were used. There were 12 items in this task: six requiring singular responses, six--plural. S was told to:

> pretend that one WIB was here. (S repeated
> WIB.) Now pretend some others come along.
> What would there be now?

This item requires a plural response with the allomorph /z/--WIBS. In every task, instructions were appropriately modified when a singular response was required.

Production--Task 3: Tell a Story. Task 3 required S to "Tell a Story" about a cartoon animal(s). Twelve pairs of pictures were used as in Task 1. In Task 3, however, the animal(s) in the second picture of each pair was always drawn performing some action. The S's job was to describe the picture. E showed S a picture and said:

> This is a GOP. (S repeated GOP.) Some others have come along to join him. (S was shown a picture of GOPS jumping rope.) Can you describe what you see in the picture?

This item required a plural response with the allomorph /s/: "I see the GOPS jumping rope." The answer was scored correct if the appropriate form of the name was mentioned in the description disregarding the description itself.

Recognition--Task 4: (1P, 2N). In Task 4, S was shown one picture (1P) while E said a pair of nonsense names (2N). For example, E showed S a single figure and said a pair of nonsense words MAJ-MAJES. S was instructed to choose the "best" name for the picture. In this example, a singular response MAJ would have been correct. Six singular and six plural pictures were used.

Recognition--Task 5: (2P, 1N). In Task 5 two pictures (one singular and one plural, but each of different animals) were shown to S while E said one name. S had to point to the picture named by E. If E said BIM, S had to point to the singular picture. If he failed to do this, a "Singular error" was recorded. Twelve pairs of singular and plural pictures were used.

Recognition--Task 6: (2P, 2N). In this task, a pair of pictures was

shown to S while E said a pair of names (ZOP-ZOPS). S had to point first to one picture as E again said the name, and then to the other named picture. Six pairs of singular and plural pictures were used.

Results

Analysis of variance (repeated measures design; Winer, 1962) for the three Production tasks revealed a significant difference among allomorphs ($F = 9.23$, $p < .01$) and among tasks ($F = 3.28$, $p < .05$). The interaction was not significant ($F = 1.33$). Table 2 shows the mean number of errors by allomorph for each of the tasks. Comparisons among allomorphs within each task were evaluated using t tests for correlated data. Significant comparisons are indicated. In all other comparisons, $t < .88$. In each task, significantly

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Insert Table 2 about here

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more errors occurred with /ɨz/ than with either of the other two allomorphs. There were no significant differences between words with /s/ and with /z/ in any of the three Production tasks. These results replicated the findings of the Pilot Study and Study 1 concerning the distribution of errors with the three allomorphs in a Production task.

Table 2 shows the distribution of errors, in the Production tasks, for the six items requiring a plural response versus the six items requiring a singular response. For each task, comparisons were made between total singular errors and total plural errors. Although more plural errors occurred in every task, the difference was significant ($t = 2.94$, $p < .01$) only for Task 1 (Words with Pictures). The total number of plural errors for all three

tasks combined was also significantly larger than that of singular errors (t = 2.50, $p < .05$).

Analysis of variance for the three Recognition tasks revealed a significant difference between tasks (F = 26.24, $p < .001$) as well as a significant interaction (F = 3.80, $p < .05$), but the difference between allomorphs was not significant (F = 1.83). This was likely due to the virtual absence of errors on Task 6 (2P, 2N). Table 3 shows the mean number of errors by allomorph for each of the three Recognition tasks. No comparisons were possible within

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Insert Table 3 about here

Task 6 because of the absence of errors. In the other two Recognition tasks, significantly fewer errors occured with /z/ than with either /s/ or with /ɨz/. There were no differences ($t < .88$) between errors with /s/ and with /ɨz/. This pattern of errors for the three allomorphs was also obtained in an exploratory study using only three Recognition tasks. This distribution of errors by allomorph is distinctly different from that of the Production tasks.

No significant differences were found between number of singular and plural errors for either the individual tasks or the combined totals. Table 3 also shows this distribution.

Comparisons among all six Production and Recognition tasks show that Task 6 is significantly easier than any of the other five tasks (t = 2.90, $p < .01$) and that Task 2 (Words Alone) is significantly harder than Task 3 (Tell a Story; t = 2.12, $p < .05$) and Task 4 (1P, 2N; t = 2.30, $p < .05$). All other comparisons yielded t values below 1.56.

Discussion

Consider first the child's productive control of pluralization rules. Table 2 indicates that the same pattern of errors by allomorph occurred for all three Production tasks. There were significantly more errors with /ɨz/ than with either /s/ or /z/, and there was no difference between the number of errors with /s/ and with /z/. The greater difficulty of /ɨz/ is probably due to the child's limited experience with nouns taking this allomorph.

The finding that the children performed better when they were given the plural and required to produce the singular than when the task was reversed, indicates that they can, to some extent, analyze a plural word into a stem and a plural marker.

In spite of the similar distribution of errors by allomorph in the three Production tasks, differences did occur among the tasks in total number of errors. Words Alone (Task 2) was the most difficult task probably because requirements of this task were not constantly emphasized through pictures. Fewer errors were made in the better structured Words with Pictures task (#1) where the pictures helped define the task requirements for the Ss. The easiest Production task, Tell a Story (#3), also well defined by pictures, captured the interest and enthusiasm of the children.

Despite the differences in level of difficulty, the Production tasks exhibit a characteristic pattern of errors distinguishing them from the Recognition tasks to which we now turn. Although the Recognition tasks also share a common pattern of errors by allomorph, they differ more among themselves than the Production tasks. We will therefore discuss separately each Recognition task.

Task 6 (2P, 2N) was the easiest of all six tasks with only three errors in 216 trials. In this task, S was shown both the singular and plural pictures of an animal while E said both the singular and plural forms of a name. S was required simply to match the names with the pictures. The child can perform accurately on this task if he matches isomorphically the longer code with the larger number of objects and the shorter code with the single object. Perfect performance on Task 6 does not require any other knowledge.

Such one-to-one matching is not possible in Task 4 (1P, 2N) where S is given only one picture and asked to choose the better of two names for it. This task is nevertheless fairly easy because S can draw on the simple generalization from English singular-plural relations that plural nouns are longer than singular nouns. This information is sufficient for deciding which of the two names is plural and which is singular. Study 2 has demonstrated that 6-year old children are able to apply this generalization when asked to choose between a longer and a shorter name for a plural referent. However, the occurrence of differences among allomorphs indicates that Ss did not exclusively depend on this generalization.

Task 5 (2P, 1N), in which a single name was offered to the child and he was required to select the picture (out of two) that best suited the name, was more difficult than the other Recognition tasks partly because the two pictures within each pair differed not only with respect to number of animals but also with respect to kind of animals. This may have rendered Task 5 less well defined than the other Recognition tasks.

The different levels of difficulty of the various tasks reveal some aspects of the mental operations underlying performance on these tasks; some other aspects are reflected in the distribution of errors. The pattern of

errors in the Recognition tasks is distinctly different from that in the Production tasks. In the Production tasks /s/ and /z/ were of equal difficulty and /ɨz/ was significantly harder than each of them, whereas in the Recognition tasks more errors occurred with /s/ and with /ɨz/ than with /z/.

In Task 4 this distribution of errors can be explained by reference to the fact that in English only a few singulars end in a /consonant+z/ cluster--lens and adze are the only cases that come to mind. Consequently, when the child is given a choice between a CVC name and a CVCz name, he can draw on this information and readily decide that the CVCz is the plural. In the case of /s/ the decision is not so easy, as many common singular nouns have a /consonant+s/ in final position (e.g., tax, wax, fence, horse). This accounts for the greater error score for /s/ than for /z/ in Task 4. In the case of /ɨz/ the difficulty may be due to the availability of singular nouns ending in /vowel+z/ (e.g., maze, breeze) and to the presence of /s/ and /z/, and sounds similar to these plural markers, in the final positions of the singular alternatives (e.g., TASS vs. TASSES, BEZ vs. BEZES, KUSH vs. KUSHES). Thus in choices involving /ɨz/ the child could mistakenly consider either both names as singulars or both as plurals. These considerations would explain why fewer errors were obtained in Task 4 with /z/ than with either /s/ or with /ɨz/.

There was no difference between the number of singular and plural errors on Task 4. This can be explained by reference to the fact that both in the case when the picture depicted a single animal (an occasion for the occurrence of singular errors) and in the case when it depicted several animals (an occasion for the occurrence of plural errors), the singular and the plural forms were given to the S who was required to choose the appropriate

one of the two. In both the singular case and the plural case, Ss could respond correctly by identifying either the singular form or the plural one, and by a process of elimination arrive at the complementary form. Since recognition of either the singular or the plural form could contribute to a correct response, no difference between the number of singular and plural errors would be expected.

Task 5 (2P, 1N) was the most difficult Recognition task. It was in fact more difficult than two Production tasks (Words with Pictures and Tell a Story). Nevertheless, the error pattern by allomorph in Task 5 is quite different from that of the Production tasks and exactly like that of Recognition Task 4. In Task 5, as in Task 4, significantly fewer errors occurred with /z/ than with either /s/ or with /ɨz/ and there was no significant difference between errors with /s/ and with /ɨz/. In the cases where the name offered was a plural one, the explanation proposed for the distribution of errors in Task 4 obviously applies here too. Names ending in /consonant+s/ and in /vowel+z/ are not as reliably plurals as are names ending in /consonant+z/. When the name is in singular form, the plural-sounding endings of the nouns taking /ɨz/ in the plural (e.g., RESS, NIZ, PASH) could lead the child to regard the singulars as plurals. If this suggestion is accepted it would account for the greater number of errors made with /ɨz/ than with /z/. But why were there more errors with unvoiced singulars (those taking /s/ for pluralization) than with voiced singulars (taking /z/)? Perhaps in deciding whether a particular name is singular or plural, S tried, covertly, to generate the complementary form, and since the complementary form of unvoiced singulars (ending in /consonant+s/) is not as obviously plural as that of voiced ones (ending in /consonant+z/), S had greater difficulty in identifying the

unvoiced CVC names as singular than the voiced CVC names.

The finding that there were fewer plural than singular errors in Task 5, although not significantly so, deserves comment because it goes contrary to the trend in all other tasks. This difference may mean that the presence of a plural allomorph is more suggestive of plurality than its absence is of singularity, possibly because irregular plurals have a singular shape.

Conclusions

Two general conclusions are suggested by the results of the above experiments.

(a) In studies of retention, recognition memory is commonly distinguished by its sensitivity to memory traces too faint to be picked up by recall techniques. But both methods are viewed as assessing the same underlying process; recognition is considered merely a finer measure of the same thing measured crudely by recall. Similarly, in language studies, recognition and production methods are usually distinguished in terms of degree of difficulty. The present findings challenge the general validity of characterizing the difference between recognition and production procedures solely in quantitative terms. In the experiments described in this paper, level of difficulty did not differentiate recognition tasks from production tasks, only the pattern of errors did. The two procedures were seen to have tapped different aspects of the Ss' linguistic knowledge. While in production tasks, Ss had to depend mainly on the information contained in the rules governing English pluralization, in the recognition tasks, they could have drawn, and in many cases did draw, on the generalization that in English, plurals

are longer than singulars and that few singulars end in /consonant+z/ clusters.

(b) The second lesson we have learned from the described experiments is that in studying particular linguistic rules one should not ignore other linguistic information available to the Ss. Although English pluralization rules do not prohibit the formation of singular nouns ending in /consonant+z/, nevertheless the rare occurrence of such nouns had an effect on Ss' responses in our experiments. It should always be kept in mind that when a S participates in an experiment designed to investigate a particular segment of linguistic rules, his responses need not be guided solely, or even mainly, by these rules. S has access to a larger store of knowledge--including grammatical rules, language habits, statistical facts--than the experimenter is investigating, and is able to bring this knowledge to bear on the problem at hand.

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Footnotes

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Table 1

Distribution of Responses in Study 1

	Correct Responses		Incorrect Responses	
	With Numbers	Without Numbers	With Numbers	Without Numbers
/s/	17/42 = .40	11/42 = .26	10/42 = .24	4/42 = .10
/z/	22/42 = .52	13/42 = .31	5/42 = .12	2/42 = .05
/ɨz/	14/84 = .17	22/84 = .26	38/84 = .45	10/84 = .12
TOTAL	53/168 = .32	46/168 = .27	53/168 = .32	16/168 = .09

Table 2

Distribution of Singular and Plural Mean Errors

on Production Tasks

Task	Singular	Plural	Total	Significant *t* values
1 (Words with Pictures)				
/s/	.17	.44	.61	2.90
/z/	.11	.33	.44	
/ɨz/	.45	1.06	1.51	3.52
Total	.73	1.83	2.56	
2 (Words Alone)				
/s/	.28	.28	.56	6.32
/z/	.39	.33	.72	
/ɨz/	.88	1.28	2.16	7.14
Total	1.55	1.89	3.44	
3 (Tell a Story)				
/s/	.22	.17	.39	3.79
/z/	.22	.34	.56	
/ɨz/	.50	.94	1.44	2.91
Total	.94	1.45	2.39	
TOTAL	3.22	5.17		

Note.--In each task, the first *t* value is for the /s/ vs. /ɨz/ comparison and the second for the /z/ vs. /ɨz/ comparison. All *t*'s are significant at the .01 level, two-tailed tests.

Table 3

Distribution of Singular and Plural Mean

Errors on Recognition Tasks

	Task	Singular	Plural	Total	Significant t values
4	(1P, 2N)				
	/s/	.28	.50	.78	3.49
	/z/	.17	.17	.34	2.91
	/±z/	.33	.33	.66	
	Total	.78	1.00	1.78	
5	(2P, 1N)				
	/s/	.78	.44	1.22	3.74
	/z/	.33	.17	.50	2.65
	/±z/	.56	.50	1.06	
	Total	1.67	1.11	2.78	
6	(2P, 2N)				
	/s/	.06	.06	.12	
	/z/	-	-	-	
	/±z/	-	.06	.06	
	Total	.06	.12	.18	
TOTAL		2.51	2.23		

Note.--In each task, the first *t* value is for the /s/ vs. /z/ comparison and the second for the /z/ vs. /±z/ comparison. The first three *t*'s are significant at the .01 level and the last one at the .05 level, two-tailed tests.

Sample of Pictures Used in Study 3